

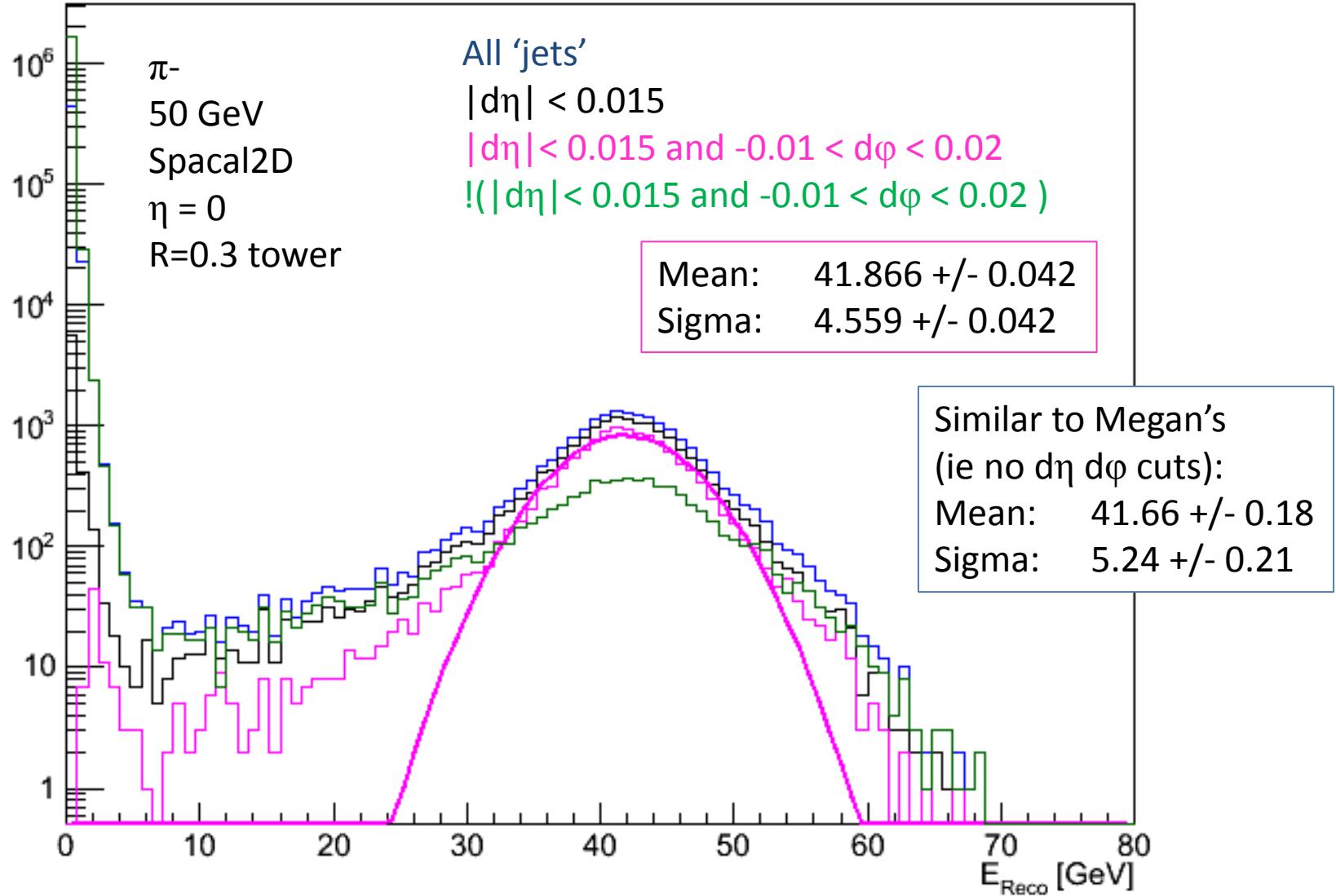
sPHENIX HCal simulations

Sarah Campbell

Jan 12, 2015

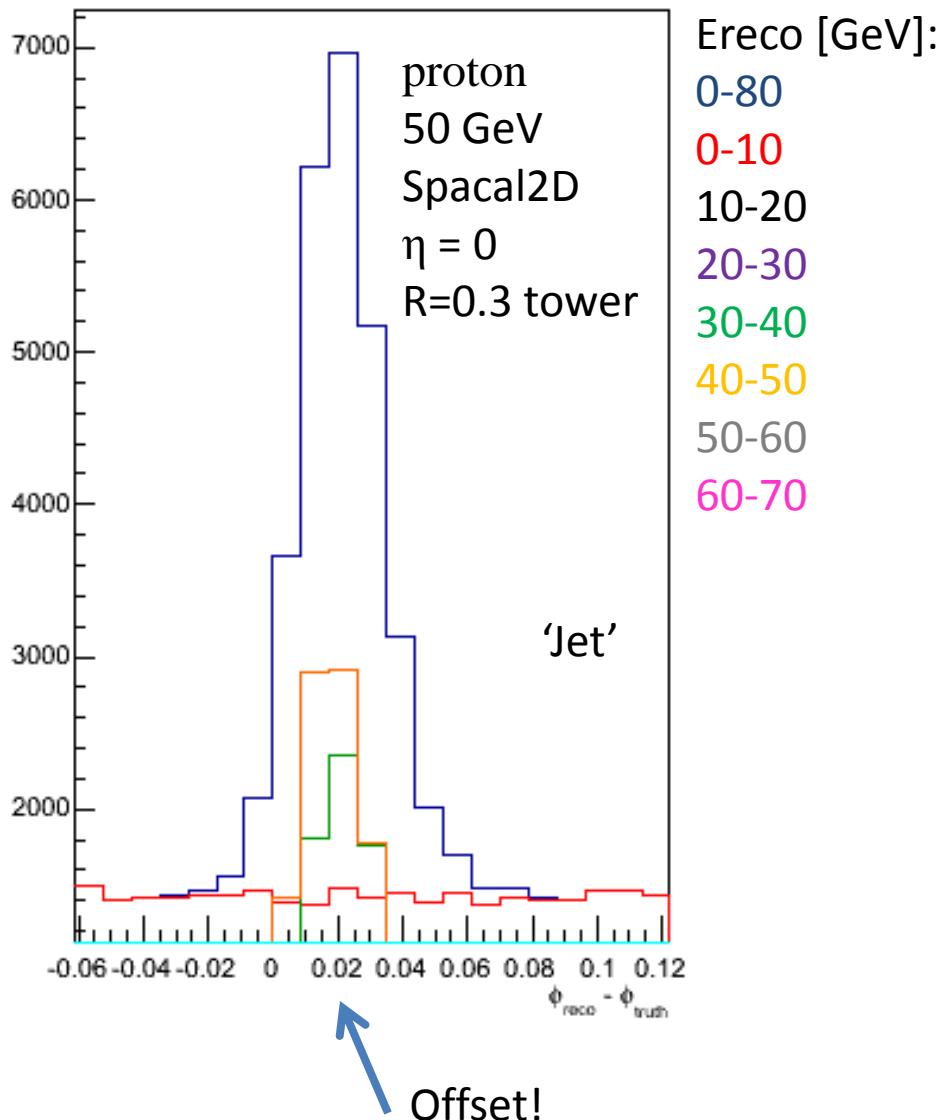
Hcal workfest in Dec

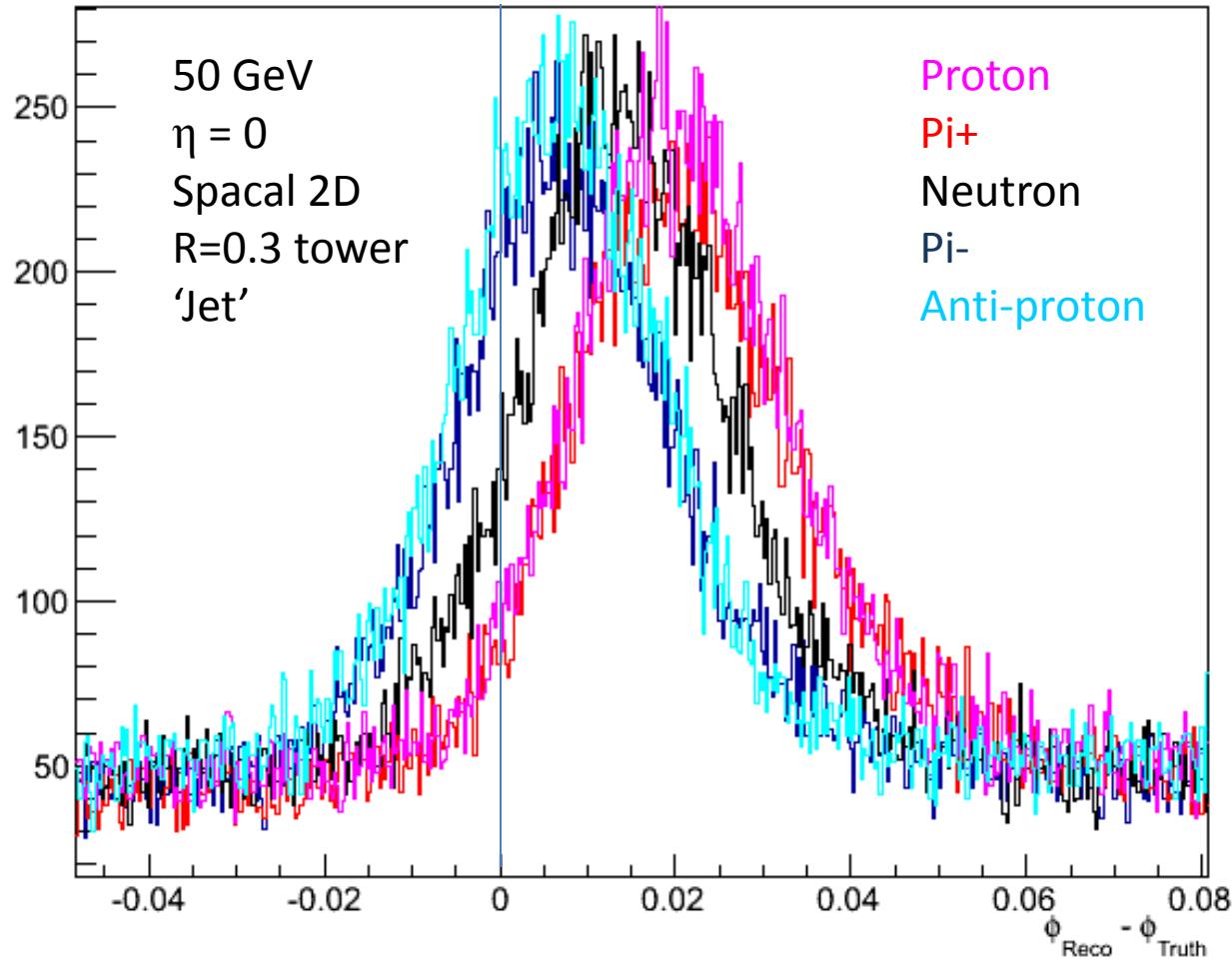
- Worked with Megan on jet simulations in sPHENIX with HCal
- Ran over single particle simulations with jet framework
 - pythia not yet available at the time
- Everything here is spacal2D, eta = 0



- Still has non-gaussian tails

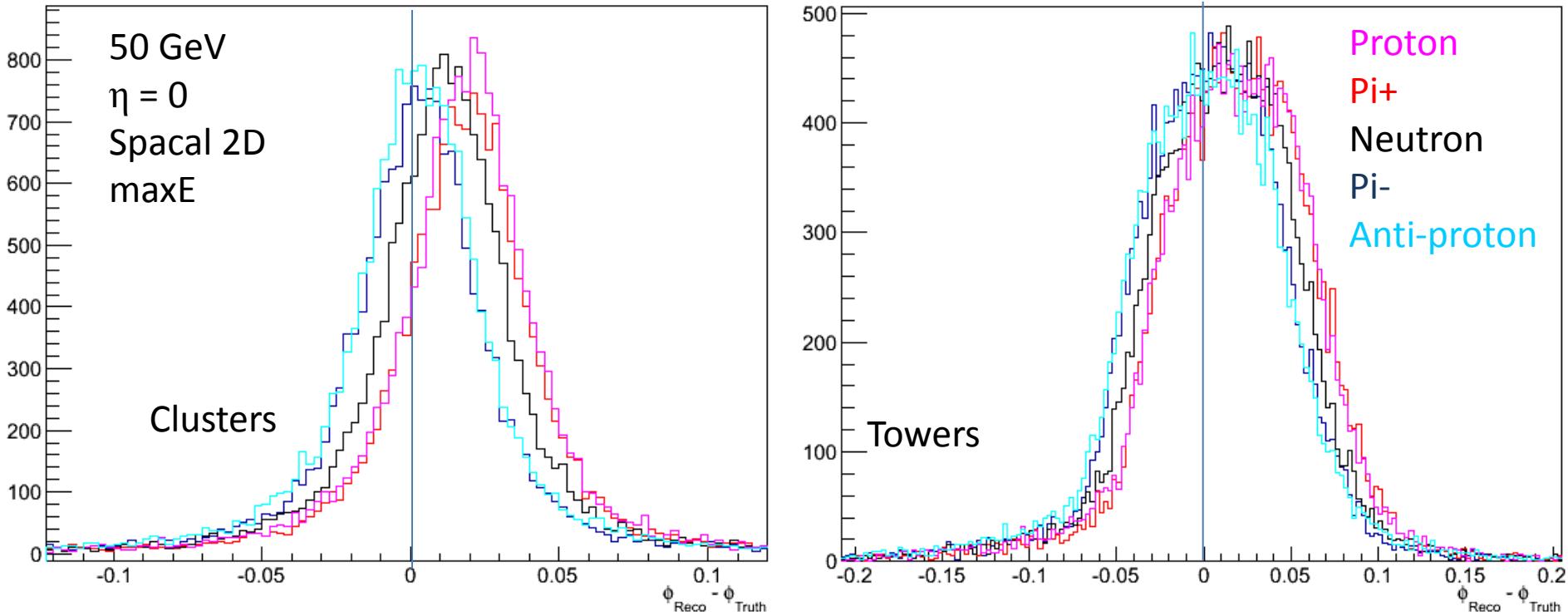
- Noticed a difference between $\varphi_{\text{reco}} - \varphi_{\text{truth}}$ in pi- and protons
 - Thought was it could be due to different shower depths of baryons and mesons
- Not seen in eta





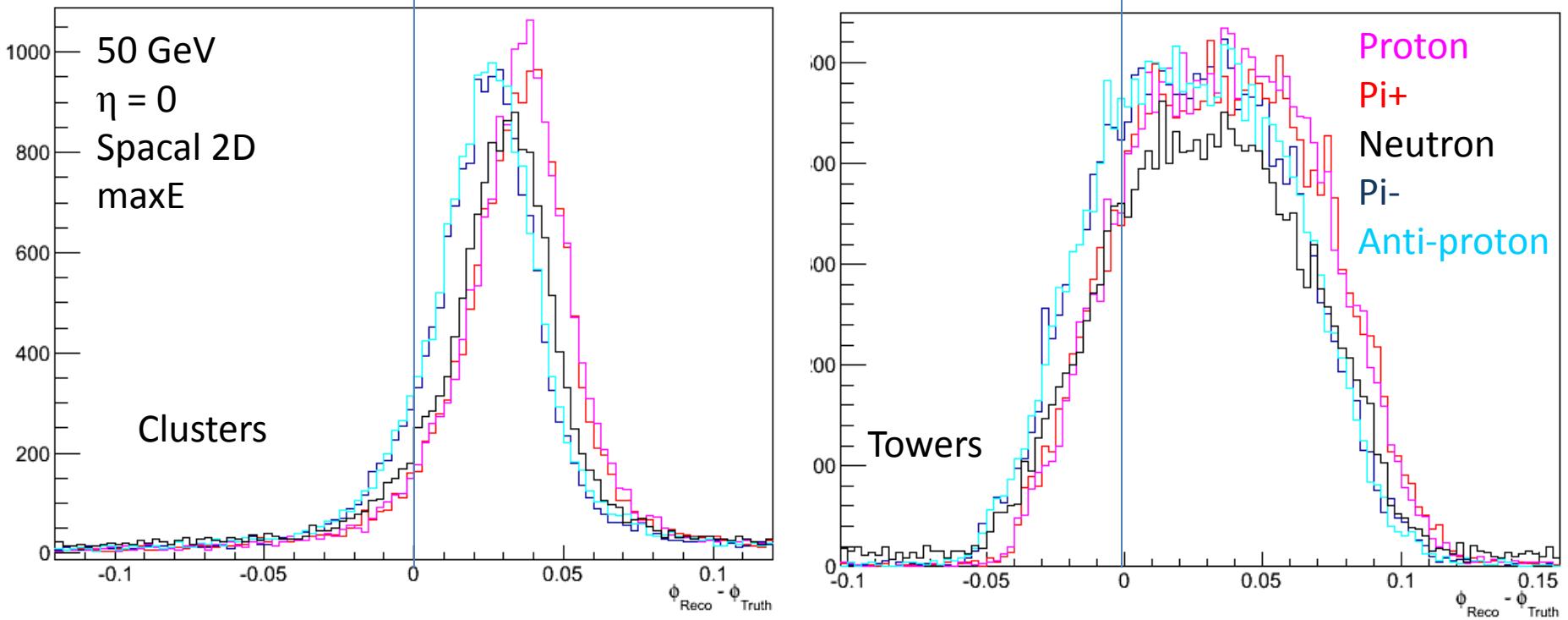
- It's charge dependent → check subsystems
 - Field effect?

HCalOut



- Seen in highest E HCalOut clusters (towers) in the event → not specific to making a 'jet' or clustering

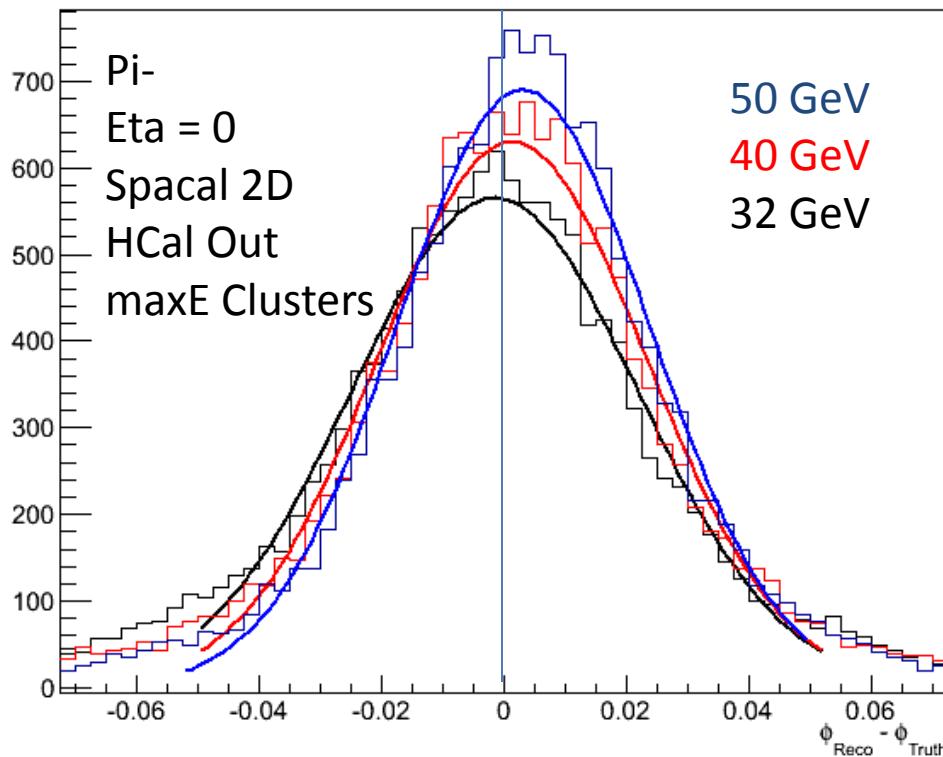
HCallIn



- Seen in highest E HCallIn clusters (towers) in the event → not specific to a detector

Vary energy

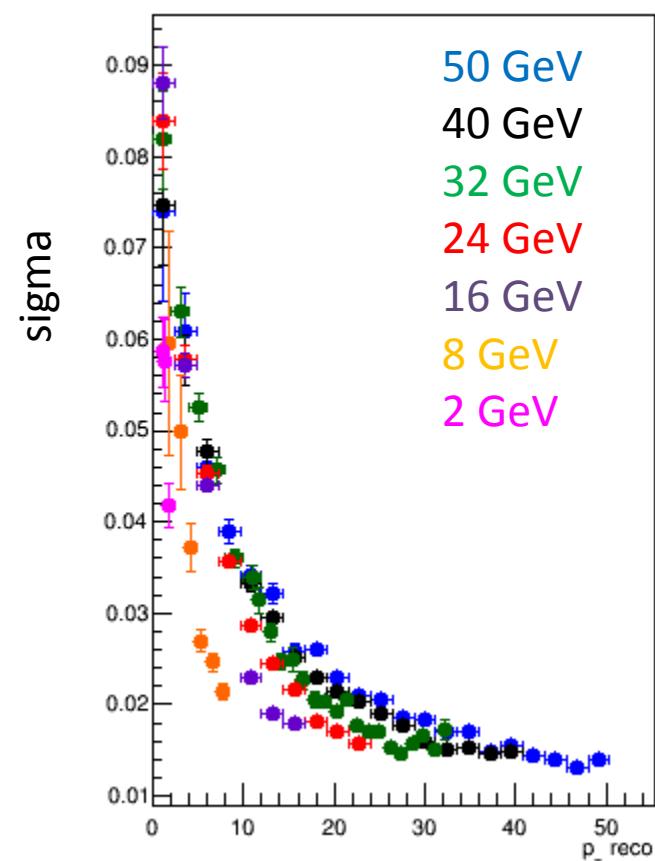
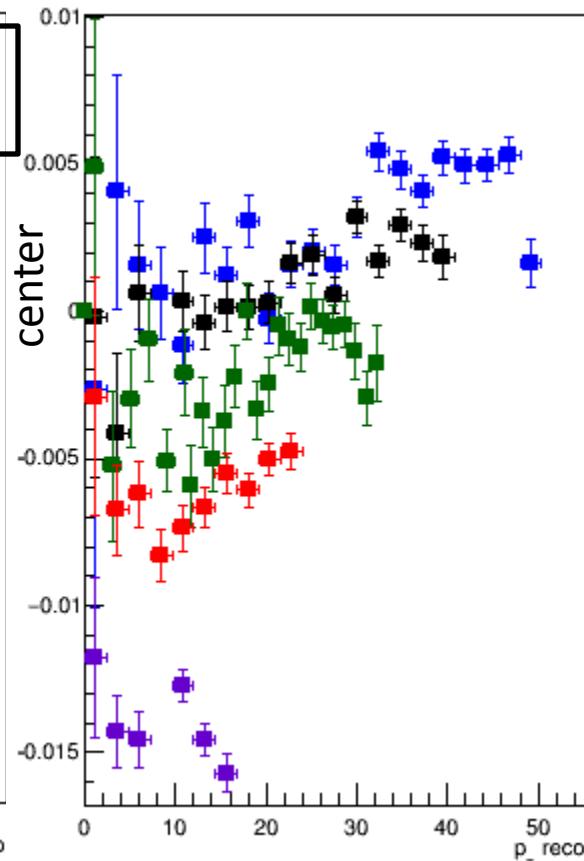
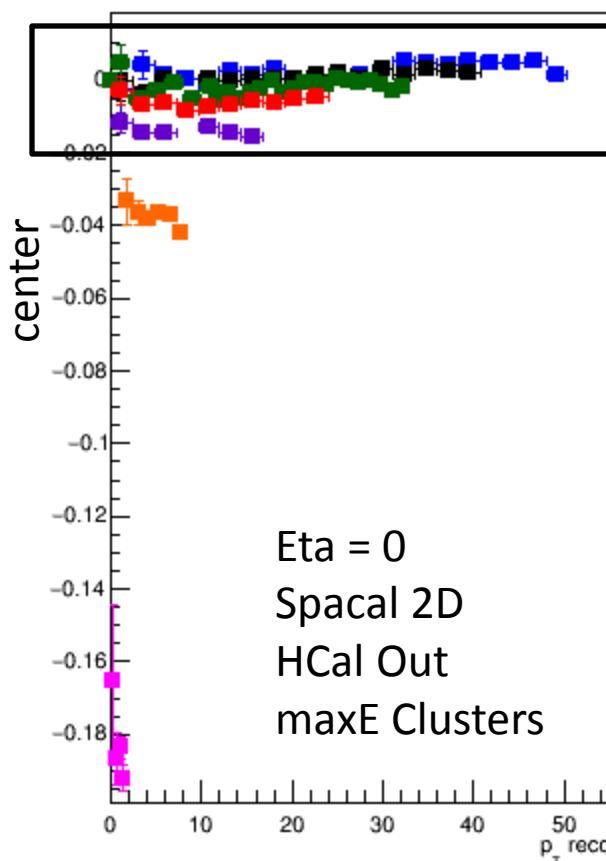
- If it is magnetic field offset it should be stronger in lower momentum particles



Energy pi-	Mean of dphi
32 GeV	-0.001565 +/- 0.000226
40 GeV	0.001272 +/- 0.000201
50 GeV	0.003082 +/- 0.000183

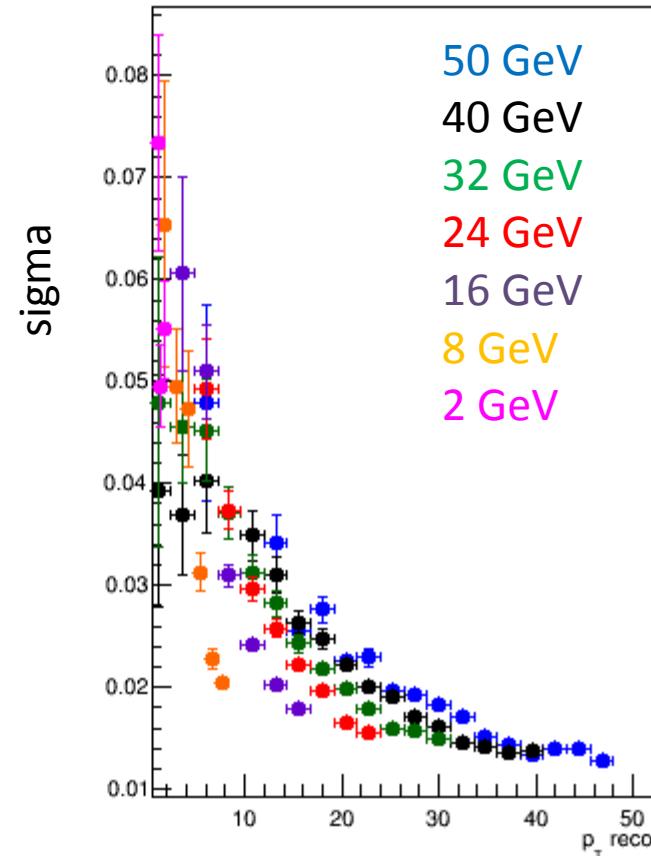
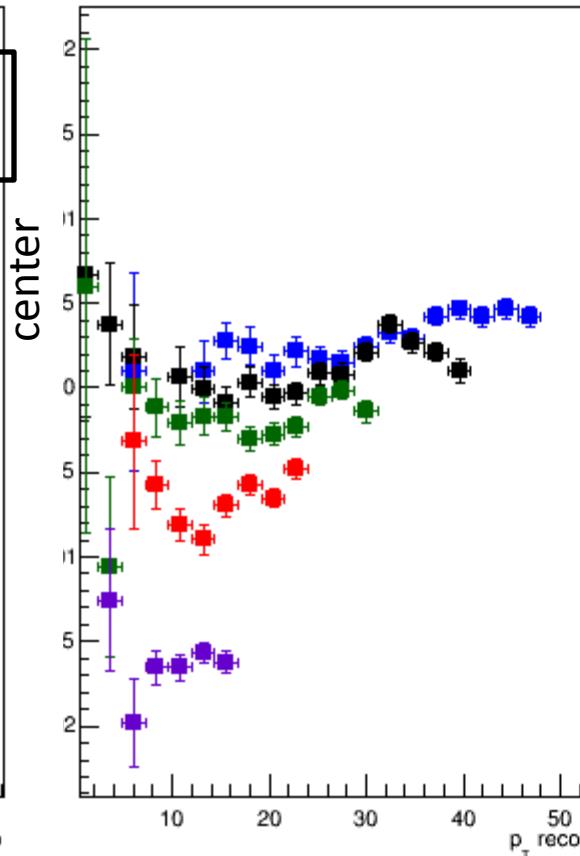
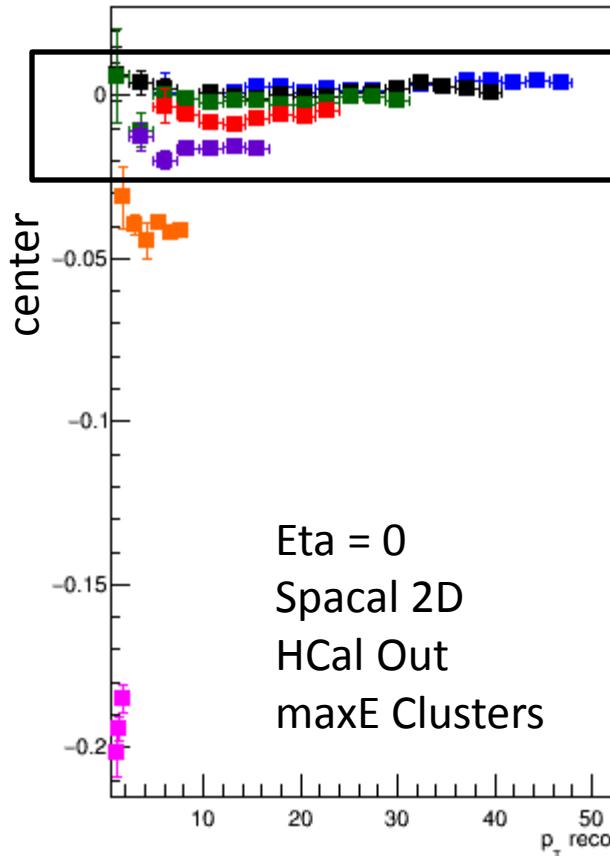
π^- : $d\varphi$ vs p_T reco

- There is an E_{thrown} dependence
- Not much of a p_T reco dependence, unlike sigma



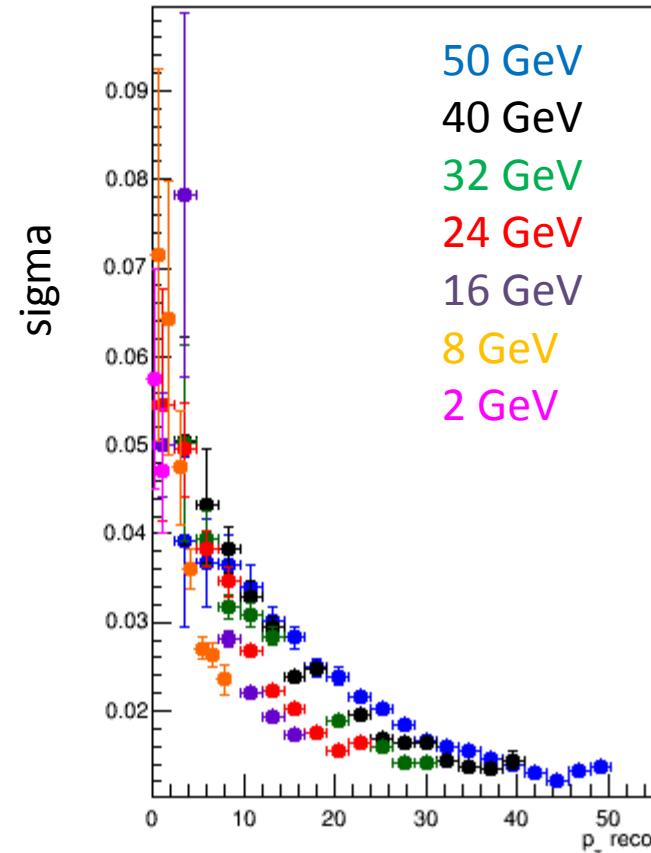
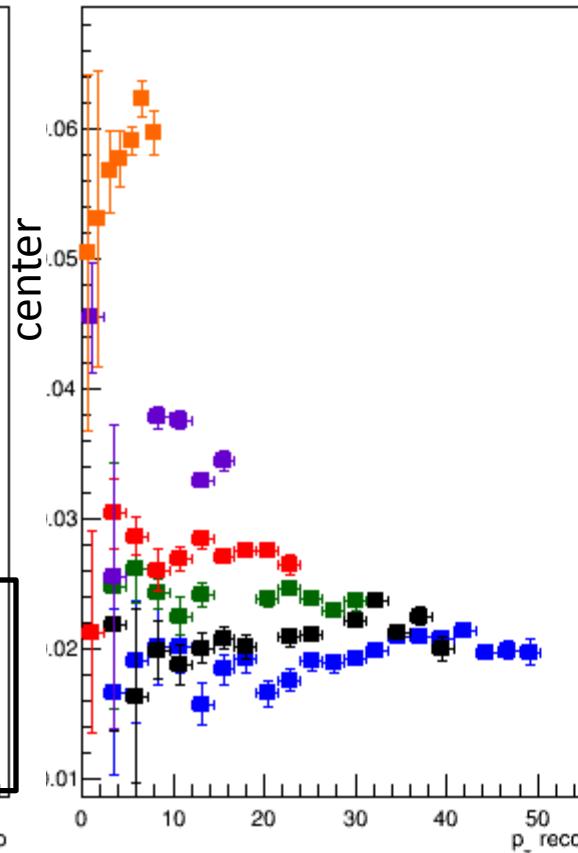
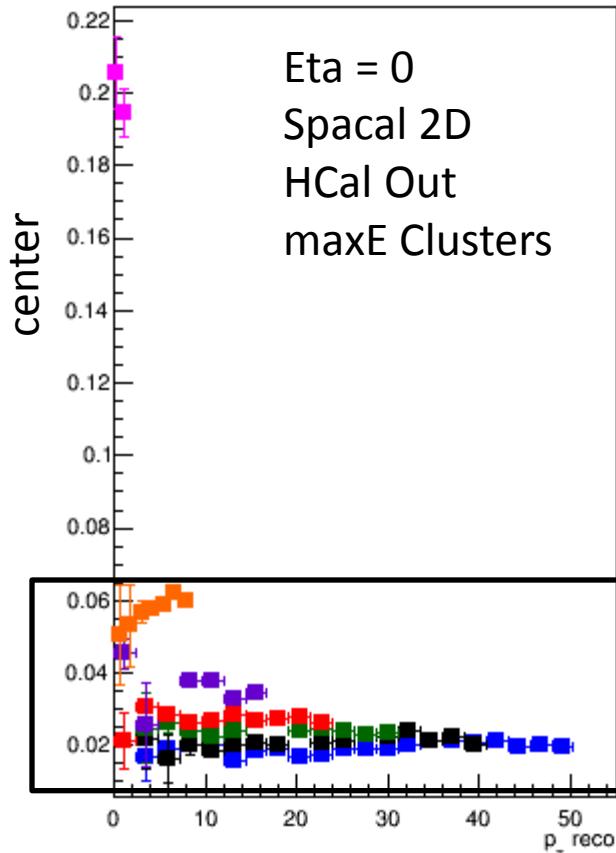
pbar: $d\phi$ vs p_T reco

- There is an E_{thrown} dependence
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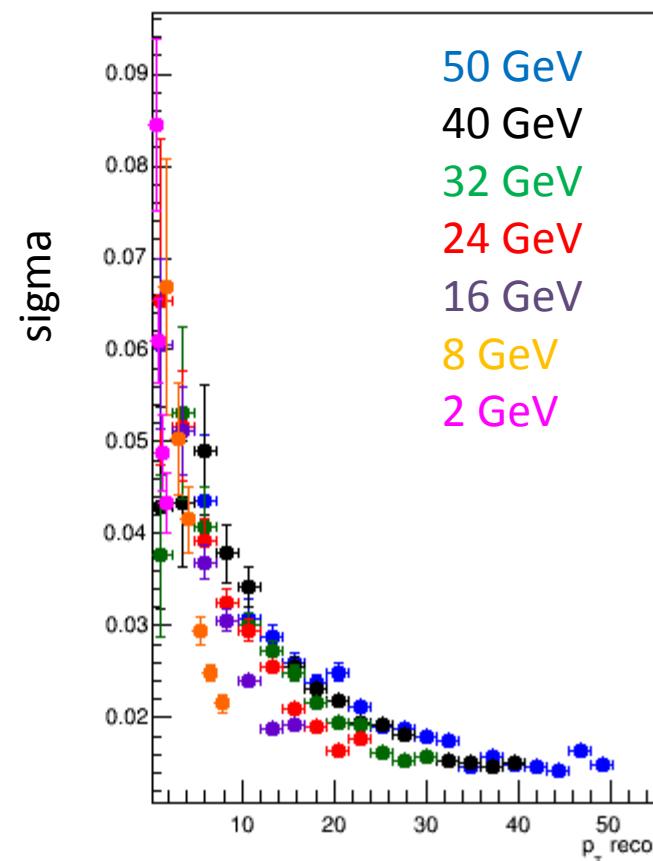
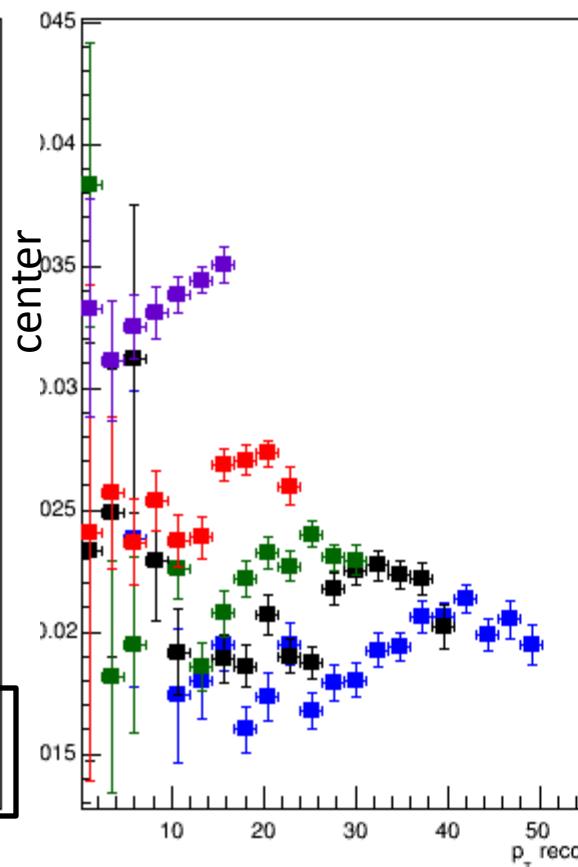
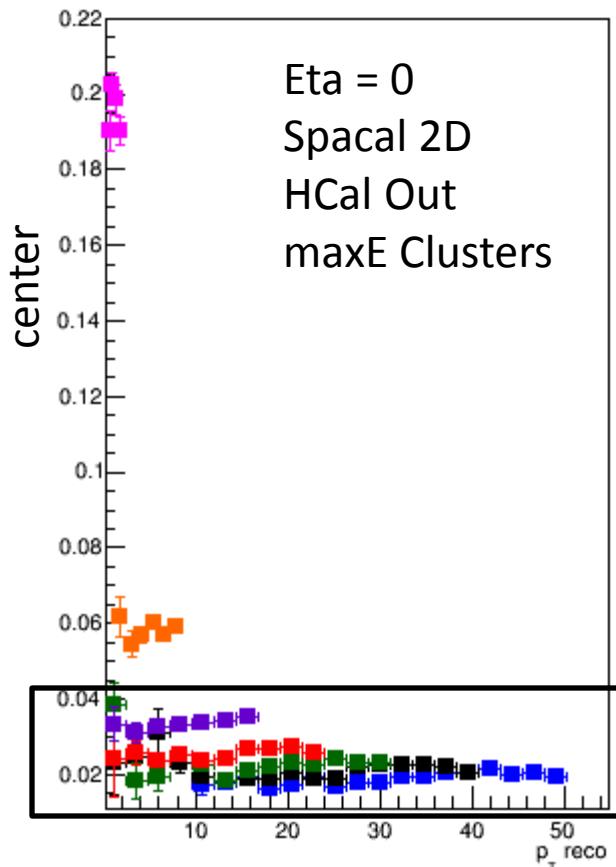
$p: d\varphi$ vs p_T reco

- There is an E_{thrown} dependence
- Not much of a p_T reco dependence, unlike sigma



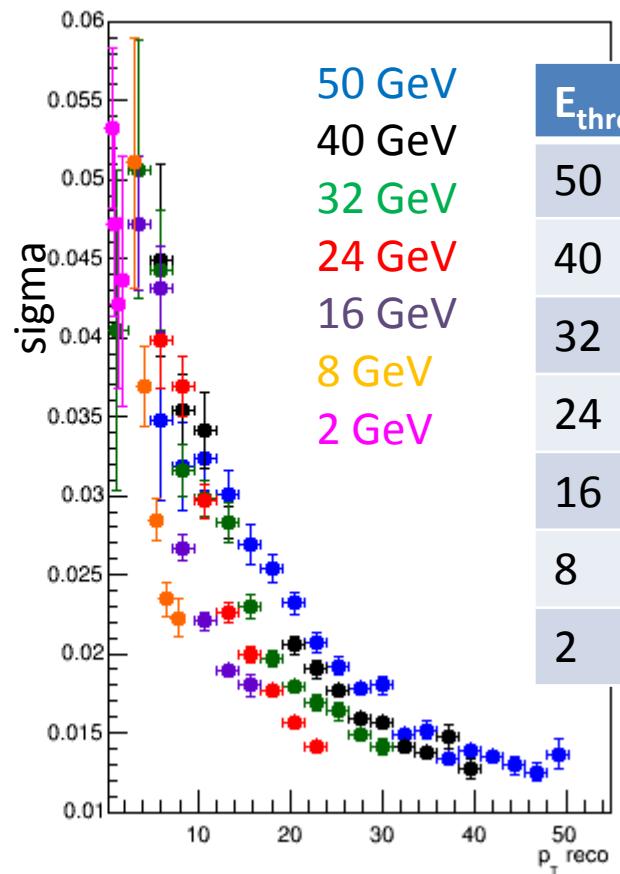
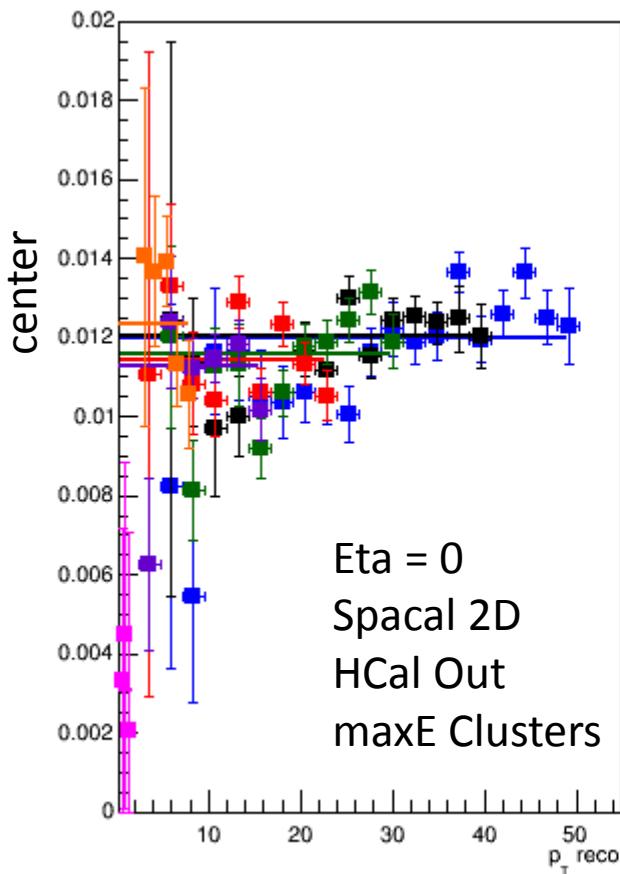
π^+ : $d\phi$ vs p_T reco

- There is an E_{thrown} dependence
- Not much of a p_T reco dependence, unlike sigma



$n: d\varphi$ vs p_T reco

- There is an overall alignment offset ~ 0.01177
- Little to no variation in center with E_{thrown}



E_{thrown}	pol0
50	0.01197 ± 0.0002
40	0.01204 ± 0.0002
32	0.01160 ± 0.0002
24	0.01143 ± 0.0003
16	0.01125 ± 0.0003
8	0.01231 ± 0.0006
2	0.00308 ± 0.0021

dphi vs E_{thrown} – a mass effect?

- Fit with pol0 in p_T reco for each E_{thrown}
- Correct for n alignment offset
- Error size ~ 0.00028

E_{thrown}	P-n	Pbar -n	Pi+ - n	Pi-n
50	0.00794	0.00867	0.00736	0.00846
40				
32				
24				
16				
8				

Still working on this...

Conclusions

- Check plots vs p_T true for each particle type?
- Sigmas seem pretty similar, need to make plot
- Expect different alignment offsets in HCalIn
- Zero field files not in hcalfest location anymore
- Look at newer simulation files from Chris
- Is this interesting/important?

backup

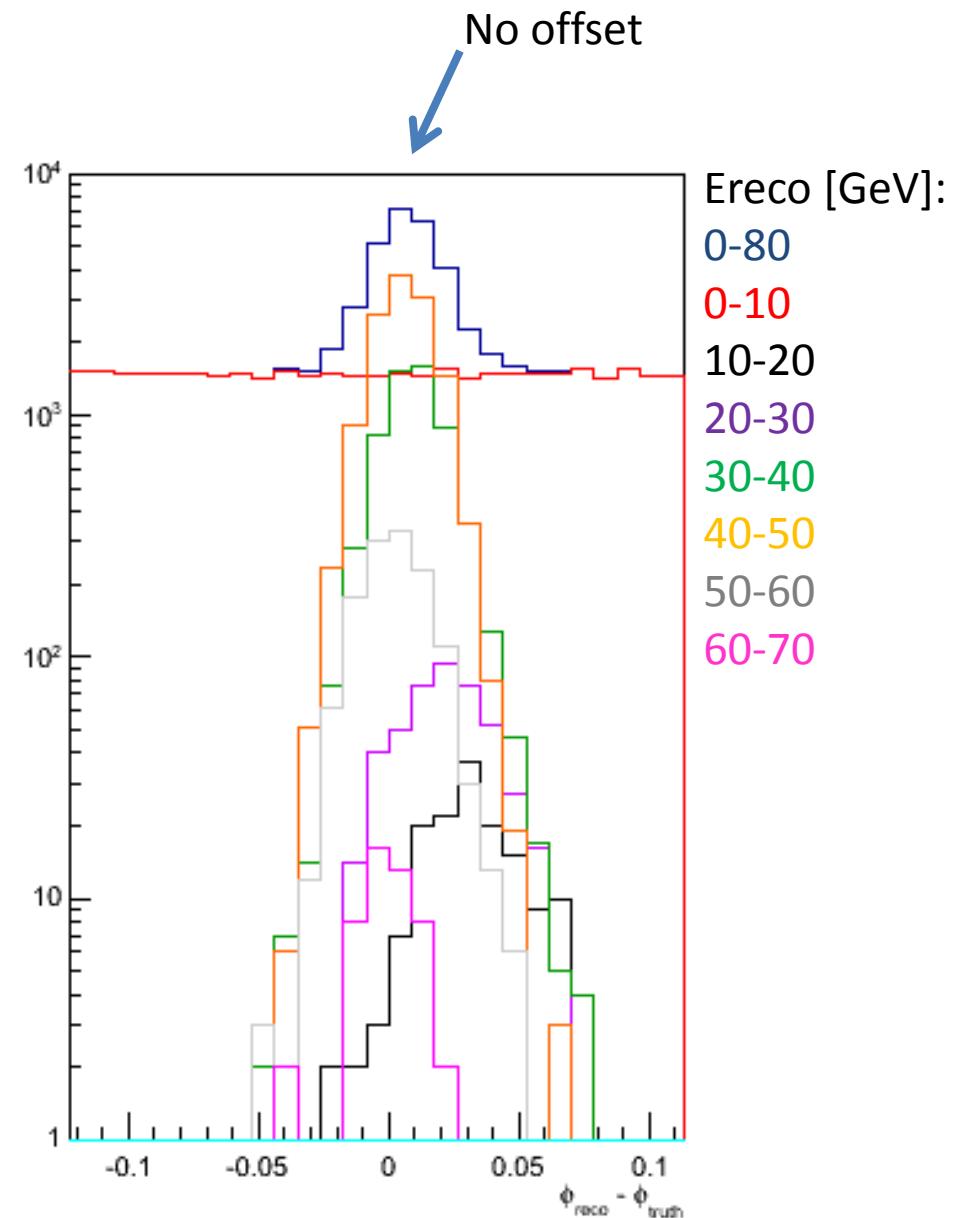
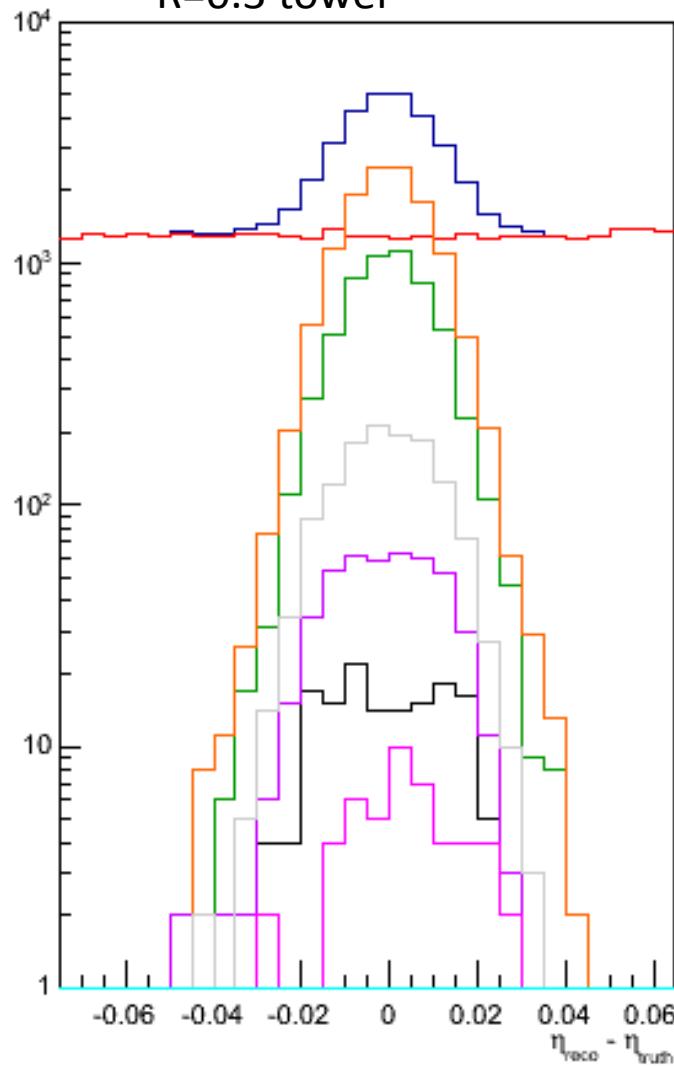
Anti-proton

50 GeV

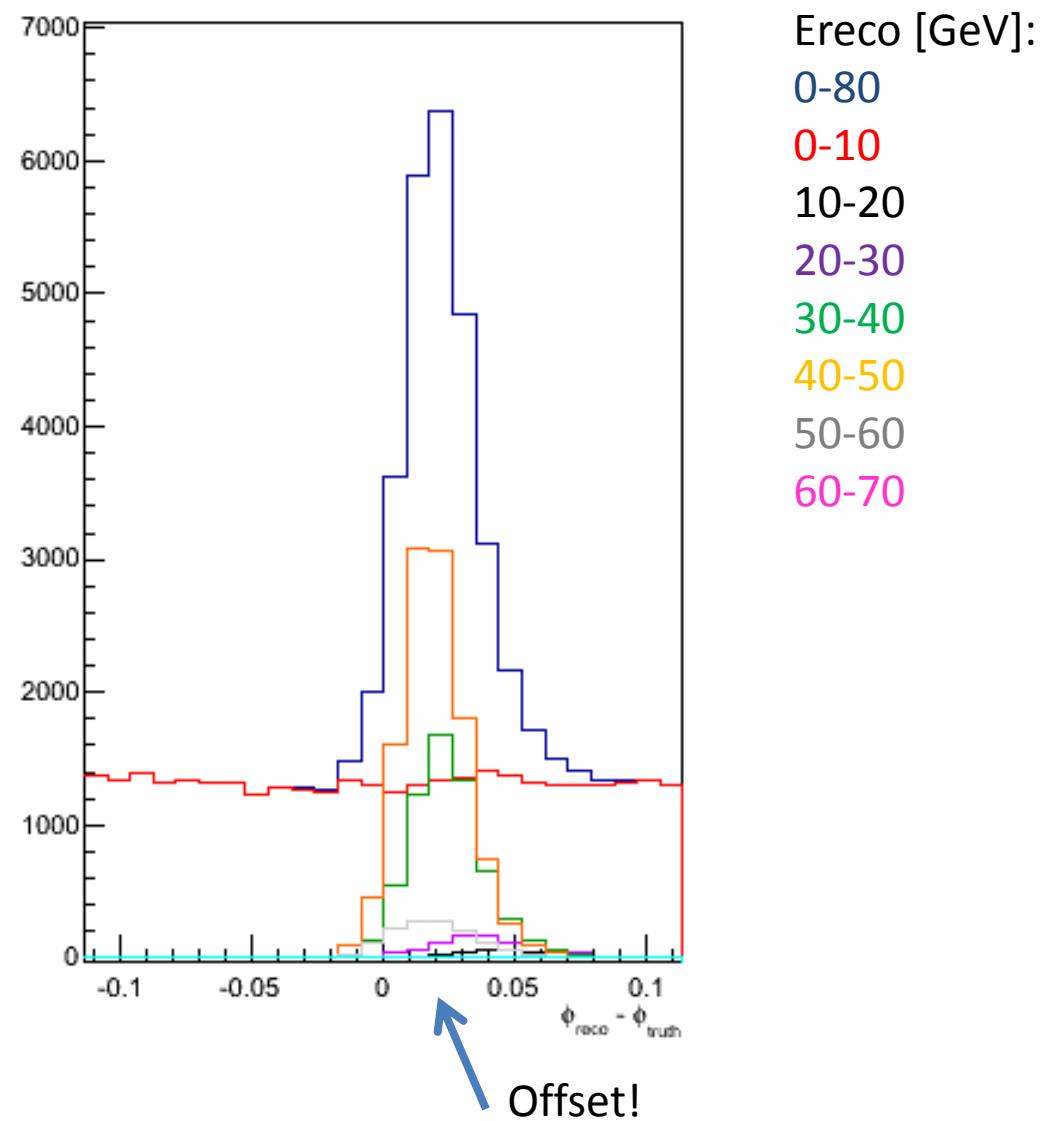
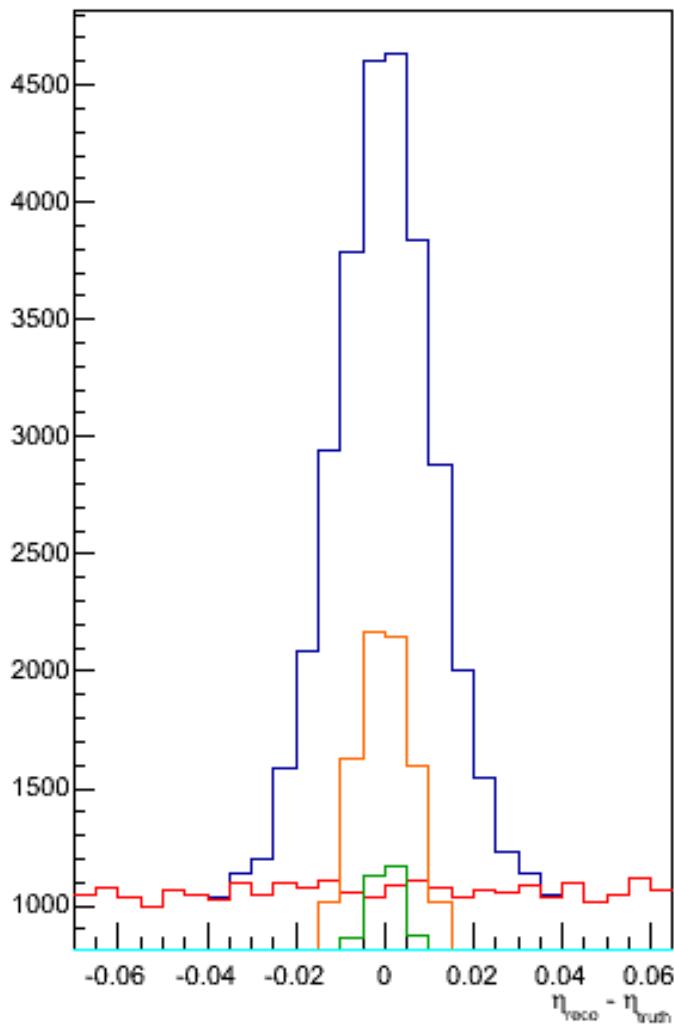
$\eta = 0$

Spacal 2D

R=0.3 tower



Pi+
50 GeV
 $\eta = 0$
Spacal 2D
R=0.3 tower



Neutron
50 GeV
 $\eta = 0$
Spacal 2D
 $R=0.3$ tower

